Chapter 14

14. NATURAL RESOURCES MANAGEMENT

This chapter includes those management practices that directly affect soil, water, vegetation, and fauna. It includes forest management, fish and wildlife habitat and population management, and land management. Other programs include management for wetland protection, water, pest, and urban-related wildlife.

14-1 Objectives

Military Readiness

- Ensure no net loss in the capability of installation lands to support existing and projected military missions on Fort Wainwright
- Restore damaged training areas and provide improved troop training environments that can sustain training indefinitely
- Maintain forested lands in conditions needed to support the military mission

Stewardship

- Use ecosystem management philosophies to protect, conserve, and enhance native fauna and flora with an emphasis on biodiversity enhancement
- Provide economic and other human-valued products of renewable natural resources when such products can be produced in a sustainable fashion without significant negative impacts on the military training mission
- Ensure that Fort Wainwright's natural resources program is coordinated with other agencies and conservation organizations with similar interests

- Protect and conserve all biological communities, including game and non-game species.
- Protect soil integrity and enhance soil productivity
- Manage the forest ecosystem at Fort Wainwright to enhance ecosystem integrity and produce forest products on a sustainable basis
- Enhance and maintain the forest to support the Fort Wainwright military mission. Whenever feasible, use commercial means for removing timber to support military construction projects or training operations
- Investigate options to commercially harvest sawtimber, pole timber, and/or pulpwood on lands at Fort Wainwright
- Use forest management to protect the forest ecosystem from significant losses due to insects, disease, and/or fire
- Continue and enhance the Christmas tree and firewood program on Fort Wainwrigh.
- Improve habitat for moose and grouse without significant negative overall impacts to other species
- Improve the quality of habitat for game and non-game species
- Use artificial nesting structures to improve productivity for wildlife species
- Produce game on a sustainable basis to support hunting, trapping, and fishing programs
- Control noxious plants and pest animals in a manner that supports the military mission, promotes sustained ecosystem functionality, favors native species, and adds to the quality of life of the Fort Wainwright and surrounding communities
- Avoid adverse impacts to aquatic resources and mitigate unavoidable adverse impacts.
- Use regionally native plants for landscaping
- Use construction practices that minimize adverse effects on the natural habitat
- Implement water-efficient practices and demonstrate these practices to promote their use elsewhere
- Maintain a current Fort Wainwright Pest Management Plan
- Reduce pesticide use through alternative strategies (sanitation, trapping, biological control, mechanical control, etc.)
- Provide refresher training for Pest Control personnel certified for pesticide handling

Quality of Life

- Manage game species within biological and recreational carrying capacities of the resources
- Maintain an aesthetically pleasing cantonment area landscape that maintains natural ecosystem functions as much as possible
- Support quality of life programs through the sale of personal use Christmas trees and firewood

Compliance

- Manage natural resources within the spirit and letter of environmental laws, particularly the Sikes Act upon which this INRMP is predicated
- Identify, protect, restore, and manage sensitive species and wetlands
- Use procedures within the National Environmental Policy Act (NEPA) to make informed decisions that include natural resources considerations and mitigation
- Implement this INRMP within the framework of Army policies and regulations
- Protect water quality and its associated values on Fort Wainwright watersheds and on watersheds that drain from the installation
- Manage wetlands to ensure “no net loss”
- Minimize pollution by reducing fertilizer and pesticides, using integrated pest management, recycling green waste, and minimizing runoff

Integration

- Ensure the integration of, and consistency among, various activities identified within this INRMP
- Ensure that natural resources management is consistent with principles of Integrated Pest Management at Fort Wainwright
- Coordinate implementation of natural resources management with the overall Fort Wainwright environmental program
- Coordinate implementation of this INRMP with military training organizations

14-2 Forest Management

Forest management is required to protect, maintain, and enhance military training environments. Tree density, ground cover, and other factors within the forest ecosystem are critical to the accomplishment of the military mission. In addition, management of the forest ecosystem is important to maintain biodiversity, wildlife habitat management, and the development of outdoor recreation. The objectives of the forest management program at Fort Wainwright during 1998 to 2002 are to inventory forest resources (Section 12-2e), conduct a commercial forestry feasibility study (Section 14-2b), create a forest ecosystem management plan (Section 14-2a), and manage forest and vegetative resources in support of the military mission and ecosystem management principles (Section 14-2c).

Under applicable withdrawal legislation for Tanana Flats Training Area and Yukon Training Area, BLM retains vegetative and mineral rights. Any vegetation manipulation by USARAK must be approved by BLM. The sale of timber from these lands would be governed by common BLM timber management practices, contract stipulations, and the mandates of the state's forest practices regulations. The withdrawals for the Main Post training areas do not indicate any vegetative or mineral management responsibilities for BLM and therefore any sale of timber would be processed throught the Army's forest management system.

14-2a Forest Management Plan

Project Description. Prepare, update and implement a forest management plan for Fort Wainwright.

Project Justification. The management of forest and woodland resources is consistent with ecosystem management principles and is required by the Sikes Act and AR 200-3. Development of a forest management plan is also required by the Resource Management Plan mandated under the military land withdrawal Public Law 99-606. Implementation of the plan will maintain and enhance the health, productivity, and biological diversity of forest and woodland ecosystems. Forest diversity is needed for a varied training environment.

Project Prescription. A forest management plan will be contracted to start in 1999 with completion during 2000. Total land area available for forest management is 374,678 acres (Tanana Chiefs Conference, 1993). The plan will use information from the *Forest Resources of Bureau of Land Management and Military Lands Within a 100 Mile Radius of Fairbanks, Alaska* (Tanana Chiefs Conference, 1993) and more specific information from completed portions of the Fort Wainwright forest inventory (described in Section 12-2e). The plan must remain within the constraints of the military mission and must also consider ecosystem management principles of preservation and manipulation of habitat, conservation of wildlife, outdoor recreation, and public safety. It may mandate the maintenance of uncut buffer strips along streams and lakes. The plan should address allowable harvest levels, reforestation methods, and appropriate silvicultural methods by measuring the impact of each on military needs, recreational opportunities, and economic considerations.

14-2b Conduct Commercial Forest Management Feasibility Study

Project Description. Conduct a feasibility study to determine if there is a market to support commercial forestry on Fort Wainwright. The plan will determine the opportunity for harvest and the sustainable allowable cut of timber and fuelwood as well as evaluate the potential for market demand.

Project Justification. There has been some public interest in the timber resource. BLM controls the timber rights on USARAK withdrawn lands under PL 99-606 and PLO 2676. The Army would like to evaluate the potential for commercial forest management to implement ecosystem management, habitat enhancement, and reduce military training support costs. Forest management is a requirement of AR 200-3.

Project Prescription. The project will be completed by 2000. It will be closely tied to the development of a forest ecosystem management plan (Section 14-2a) for Fort Wainwright. It will use information from the *Forest Resources of Bureau of Land Management and Military Lands Within a 100 Mile Radius of Fairbanks, Alaska* (Tanana Chiefs Conference, 1993) and more specific information from completed portions of the Fort Wainwright forest inventory (described in Section 12-2e). The study will emphasize market availability, implications of laws and agency regulations, agency responsibilities, and cost/benefits.

14-2c Forest Ecosystem Management

Project Description. Conduct forest ecosystem management on Fort Wainwright to support military training requirements and ecosystem mangement objectives. Forest ecosystem management does not just involve commodity production; protection of sensitive habitats and needs of the military for cover and concealment are primary objectives. Timber, fuelwood or Christmas tree sales may be used to accomplish military or ecosystem objectives. Timber stand improvement may also be utilized as a tool to accomplish habitat improvement or to improve the commercial value of forest tree species.

Project Justification. Forest ecosystem management is necessary to support military training by reducing forest density and implementing habitat management. Ecosystem management will support increased biodiversity. The Sikes Act and AR 200-3 require forest management.

Project Prescription. Fort Wainwright's forestry program has emphasized the sale of Christmas trees and firewood as well as urban landscaping on Main Post. Future management of the forest ecosystem on Fort Wainwright will be geared toward supporting the military mission, protecting ecosystem functionality, sustainable production of forest products, and providing quality recreational opportunities.

This project will be completed in cooperation with BLM, which holds timber rights under Public Law 99-606 (Yukon Training Area) and other land withdrawal legislation (Tanana Flats Training Area). Forests on these withdrawals fall under BLM's restricted category for management; that is, management of the withdrawal is primarily for the military, but timber harvests may be permitted. Members of the public may approach BLM for a permit to purchase timber on withdrawn lands, but each timber sale must be approved by the military.

It is important to maintain a wide variety of age and species, protect and develop old growth, protect watersheds, and protect options for future management. Forest management practices during 1998-2002 must incorporate the primary military objective of fulfilling mission requirements. This project will be influenced by development of the forest ecosystem management plan (Section 14-2a), commercial management feasibility study (Section 14-2b), and the forest ecosystem inventory (Section 12-2e).

Timber removal and other forest management practices will be coordinated with Range Control to ensure minimal disruption of military training. Scheduling usually will be done three to six months in advance of activities. Appropriate NEPA documentation will be completed prior to implementation of timber stand improvement projects.

14-2c(1) Conduct Timber Removal for Military Mission Support

Description. USARAK will remove or thin up to 100 acres of trees or shrubs per year during 1998 - 2002 to support military training activities. The military needs to train personnel under certain environmental conditions. This may require the removal of trees to create open areas for drop zones, small arms firing ranges, or construction. Thinning stands of trees to allow maneuverability in certain areas may also be necessary.

Methods. USARAK Natural Resources personnel have two choices when there is a need to clear or thin timber with commercial value on TFTA or YTA (withdrawn lands). It can request support from BLM

to conduct a timber sale, or it can remove the trees without selling them (by cutting or burning) upon approval from BLM and after NEPA analysis is completed. On Main Post, USARAK can sell timber, fuelwood or Christmas trees through the Army forestry program. Troops are permitted to harvest forest products to achieve training objectives. Trees less than four inches dbh may be cut without prior approval. Removal of larger trees on approved sites requires Natural Resources Branch coordination. Stumps must be less than six inches high (U.S. Army Alaska, 1994). During 1998-2002, the Army will use the best options available to remove or thin timber to support military training.

14-2c(2) Firewood and Christmas Tree Sales

Description. Conduct firewood and Christmas tree sales on the Main Post training areas for Fort Wainwright personnel. USARAK is interested in utilizing renewable natural resources to support quality of life for the Fort Wainwright community. Both Christmas trees and a limited amount of firewood can be removed from Main Post without damaging the ecosystem. In some cases, this removal serves as a timber stand improvement program and enhances training opportunities.

Methods. There is limited demand for personal firewood in the Fairbanks area as the market is saturated. Fort Wainwright personnel annually purchase about 35 Christmas trees ($5 each) and 30-35 pickup loads of firewood ($10 per load) for their personal use. YTA contains good, easily accessible birch, which is high quality firewood. Birch is strongly preferred over spruce and aspen for firewood. It provides more BTUs per cord and splits readily. An acre of high quality birch forest will yield up to 12 cords of wood.

However, YTA is withdrawn, and neither firewood nor Christmas trees may be sold from withdrawn lands without coordinating with BLM. This places a burden on Birch Hill in Main Post to supply these products. There is concern over the long-term sustainability of firewood sales from Birch Hill since it contains limited resources.

Natural resources personnel will use information from the Forest Inventory (Section 12-2e) to delineate areas with adequate amounts of reasonably high quality firewood. Areas (or individual trees if necessary) will be marked. Most training areas within the cantonment area will be used. The Public Affairs Office and Law Enforcement Command will be notified of selected areas each fall. The Natural Resources Branch will sell firewood permits. Maps showing areas where cutting is permitted will be provided with each permit.

Natural Resources personnel will select training areas on the Main Post for Christmas tree removal. Training areas are rotated each year for Christmas tree removal. The Public Affairs Office and Law Enforcement Command will be notified of selected areas by 14 November each year. The Natural Resources Branch will sell Christmas tree permits. Maps showing areas where cutting is permitted will be provided with each permit.

14-2c(3) Timber Stand Improvement

Description. Conduct Timber Stand Improvement (TSI) on Fort Wainwright to improve the quality of forest to support military training activities and improve wildlife habitat. TSI is designed to improve species composition, quality, and/or growth rate of existing stands by removing competing vegetation to allow preferred trees to grow at faster rates.

Methods. TSI is often categorized as noncommercial activities used to improve the quality of commercial timber, but it may also be used to improve forest conditions for other uses. TSI may include thinning, chemical injection, prescribed burning, etc., all of which are designed to improve species composition, quality, and/or growth rate of existing stands by removing competing vegetation to allow preferred trees to grow faster. The only TSI that will occur within the Fort Wainwright forest ecosystem is forest management used to improve conditions for military training (thinning might be an example) or to improve wildlife habitat (prescribed burning, forest clearings, etc.). Wildlife habitat enhancements are described in Section 14-3a.

14-2c(4) Forest Regeneration

Description. Regenerate forests following loss of trees. Regeneration of forests either naturally or planned, is an essential part of forest ecosystem development. Decisions to guide future forest development through planned regeneration or allow natural conditions and processes to prevail need to be made.

Methods. USARAK has no plans to artificially regenerate the forest ecosystem on Fort Wainwright. Natural regeneration will be relied upon following harvest. If commercial harvest becomes significant, USARAK will investigate the cost/benefits of planting to other forms of regeneration. In the past, ADNR preferred to manage for seed regeneration in even-aged stands, keeping all cut areas within 500 feet of seed trees. However, the agency was experiencing problems with this more natural regeneration, and planting often was required. Current methods of using uneven-aged management of mixed forests results in much better natural regeneration of white spruce, a preferred species.

14-2c(5) Timber Management

Description. Conduct timber management on Fort Wainwright. USARAK is not in a position to plan a long-term commercial forest management program for withdrawn lands. Main Post has limited forest resources, which are dedicated to supporting the military mission and providing firewood and Christmas trees. However, USARAK should continue to pursue the potential for collaborating with the BLM to develop commercial forest management programs on withdrawn lands during 1998-2002, as part of its commitment towards ecosystem management.

Methods. Management of white spruce should be conducted on a 120-year rotation, and aspen sawtimber should be conducted on a 60-year rotation. Black spruce is not suitable for commercial management. Timber should be harvested using selective harvest (taking out certain diameters on a given cut) and improving species composition at the same time using species-specific harvest. The preferred method is to cut older white spruce first (about 25 trees per acre to a 70-80% BA) as well as culls and undesirables, leaving aspen, cottonwood, and birch. This resulting mixed forest grows better than white spruce monocultures. Selective cutting also reduces *Calamagrostis* infestation of cut sites.

Sections 12-2e and 14-2a describe proposed forest inventory and development of a forest ecosystem management plan. It is envisioned that the next INRMP (2002-2006) will include a more definitive timber management program.

14-2c(6) Timber Sales

Description. Be prepared to conduct timber sales during 1998-2002. The removal and/or thinning of timber on portions of Fort Wainwright could improve conditions for conduct of the military mission and enhance the local economy. Even though USARAK has no plans for commercial harvest of timber, such opportunities may become viable during the next five years, and there may be requirements to remove timber with commercial value to support the military mission. Thus, USARAK must be prepared to use timber sales as a land management tool, if needed.

Methods. The *YTA Resource Management Plan* (BLM and U.S. Army, 1994) requires that timber sales on YTA be governed by common BLM timber management practices, contract stipulations, and the mandates of the State's forest practices regulations. Common requirements include:

- The construction, improvement, and maintenance of safe and environmentally-sound road systems
- The felling and yarding of timber in such a way as to protect soil and water quality, residual trees, and human safety
- The treatment of logged sites to prepare them for the next generation of trees
- The disposal of logging slash for silvicultural and/or fire hazard reduction purposes
- Mitigation measures for protecting wildlife habitat
- Other miscellaneous provisions, where appropriate, such as meeting minimum fire requirements and application of disease control measures

Harvest plans would be prepared prior to commercial sales of forest products. Plans would include sale boundaries, cruised volume, silvicultural prescription, road layout, best management practices for prevention of soil erosion and sedimentation, water quality considerations, cultural resources protection, wildlife considerations, harvest method(s), scaling requirements, slash disposal, site preparation, and regeneration requirements. A USARAK natural resources specialist would assist with plans for timber sales to ensure consideration of wildlife

habitat values. Documentation for compliance with NEPA as well as required cultural resources surveys would be completed prior to sales.

Unless federal standards (including those within this INRMP) are higher, USARAK will use harvest standards accepted by the Alaska Department of Forestry or specified in the *Alaska Forest Practices Act* (AK Statute 41.17).

14-2c(7) Forest Disease/Insect Prevention

Description. Minimize forest disease/insect damage. The spruce bark beetle (*Dendroctonus rufipennis* (Kirby)) is becoming more significant on Fort Wainwright in terms of its effects on the forest ecosystem. ADNR estimates that 30%-50% of forest stands older than 150 years are infected in the Fort Wainwright area. The reduction of forest fires in interior Alaska has increased the age of white spruce and susceptibility to the spruce bark beetle. Ice damage has added stress (and vulnerability) to these older trees (Peter Buenau and Stephen Claudice, personal communication).

One result of spruce bark beetle outbreaks is increased fire danger. Standing dead timber generally falls within 10 years, creating up to 40 tons of fuel per acre on the ground. The spruce bark beetle is causing problems within the Main Post area, especially on the golf course. Other potential forest disease/insect problems are minimal on Fort Wainwright at this time.

Methods. The spruce bark beetle prefers Sitka, white, and Lutz (Sitka spruce and white spruce hybrid) spruce trees greater than six inches in diameter. Sitka and Lutz spruce are not found in the Interior. Mature forests are most susceptible. Outbreaks generally last 4-5 years and then collapse. Black spruce is rarely attacked. The spruce bark beetle sometimes kills virtually all trees in older, dense stands, which makes natural regeneration unlikely due to a lack of seed sources. White spruce only produces good seed crops about one in five years. The spruce bark beetle lives between the bark and wood. Beetles emerge from infested trees and fly to new trees from mid-May until mid-June. Beetles prefer to fly to downed trees. (Holsten et al., undated)

The best prevention tactic to reduce spruce bark beetle damage is managing for a diversity of species and age classes within the forest. The combination of mature spruce and a reduction in natural disturbance is ideal for the spruce bark beetle and associated changes in the forest ecosystem. (Dr. Edward Holsten, personal communication). Thus, TSI and prescribed burning (Sections 14-2c(3) and 13-3c, respectively) would reduce susceptibility to the spruce bark beetle.

When spruce bark beetle damage on Main Post causes visible damage to aesthetics or creates safety hazards, affected trees are removed. There are means to reduce the extent of spruce bark beetle outbreaks, especially in urban areas, but these are costly to implement.

The spruce budworm (*Choristoneura* sp.), an insect defoliator, is an important pest species in forest ecosystems in interior Alaska. ADNR (Peter Buenau and Stephen Claudice, personal communication) estimates that 20,000 acres west of Fairbanks are infested. The insect affects both young and old trees. According to Holsten *et al.* (1985), the Fairbanks area is the furthest north this insect has been found in Alaska. On Fort Wainwright these outbreaks have been limited and cause relatively little damage. Large-scale control is neither needed nor feasible.

Ips species, an engraver forest pest, is found throughout Alaska, but it is most prevalent in the Interior. According to ADNR (Peter Buenau and Stephen Claudice, personal communication), *Ips* is an important pest on Fort Wainwright. *Ips* favors sites with the accumulation of slash, which has not been a factor on Fort Wainwright. Naturally occurring *Ips* outbreaks generally develop and disappear rapidly, precluding the need for direct control operations (Holsten et al., 1985).

There are no other serious forest insects or diseases known on Fort Wainwright. Holsten et al. (1985) describe important insects and diseases that affect forests in Alaska.

14-3 Fish and Wildlife Management

Fish and wildlife management on Fort Wainwright is built upon a tradition of game management to support hunting, trapping, and fishing. In the early 1980s this base broadened, driven by a growing recognition of the importance of nongame species in

ecosystem functions. More recently, an emphasis has been placed on general fauna and flora inventory. Data needed to build a nongame program as part of managing ecosystems has been, or is being, collected. Data collection will continue as part of program expansion. It will be a challenge to develop and implement management programs for nongame species and their habitats during a period of declining budgets and personnel, while maintaining high quality game management aspects of the Fort Wainwright ecosystem.

14-3a Habitat Management Plan

Project Description. Prepare, update, and implement a habitat management plan for Fort Wainwright.

Project Justification. The habitat management plan will maintain a diverse training environment, enhance recreational opportunities, and comply with the Sikes Act, Migratory Bird Treaty Act, Executive Order 12962, Recreational Fishery Resources Conservation Plan, Endangered Species Act, and AR 200-3.

Project Prescription. The plan will describe projects to improve biodiversity and moose, bear, Dall sheep, raptor, fisheries, upland game bird, and migratory bird habitats. This plan will be completed by 1999.

14-3b Habitat Management

Description. Conduct habitat management on Fort Wainwright during 1998-2002.

Justification. Habitat management is required by Public Law 86-797 (Sikes Act), AR 200-3, and the cooperative agreement for management of fish and wildlife resources on Army lands in Alaska. USARAK and BLM are responsible for habitat management on 850,000 acres of Fort Wainwright.

Prescription. Conduct habitat management on up to 200 acres per year on Fort Wainwright during 1998 – 2002.

14-3b(1) Conduct Moose Habitat Management

Description. Improve moose habitat on up to 100 acres per year on Fort Wainwright. The moose is the most important game species on Fort Wainwright. Due to protection from fires and a lack of commercial forestry, the quality of moose foraging habitat (lower successional stages of willow primarily) has declined over the years. This is especially true on YTA due to its more forested component than at TFTA. The Sikes Act strongly emphasizes management for game species, and improvement of moose habitat is an important component of compliance with this requirement.

Methods. Moose habitat improvement will include creating at least 50 acres of clearings and conducting prescribed burning on as much as is practicable per year on YTA. Section 13-3c discusses the use of prescribed burning on Fort Wainwright. Section 14-3a(3) includes a discussion of the use of the feller-buncher, hydro-axe, and bulldozer to create clearings. Clearings will be created using the following prescription:

- Lands chosen for moose habitat improvements should already have a component of willow
- Smaller treatment areas, in particular, should be round or square. Configured areas should be at least 10 acres, and these areas may be as large as 40 acres (or even larger in some cases)
- A 25-year rotation is the target for moose habitat treatment
- Cutting should be conducted in the winter or early spring, before plant food reserves are in the upper plant

Prescribed burning is discussed in Section 13-3c. USARAK will use AFS to assist with prescribed burns. As discussed in Section 13-3c(3), prescribed burning might be required to help promote preferred species over *Calamagrostis* during initial revegetation of cutover sites. USARAK, coordinating with AFS, will annually determine areas to be prescribed burned the following summer. This process will involve habitat condition, available resources to conduct burns, fuel loading, and coordination with the military mission.

Removal of trees for forest management, personal use, or military purposes can also improve wildlife habitat in some cases. These treatments include salvage operations, construction and right-of-way clearing, and firewood or Christmas tree removal. Since these costs would be incurred anyway, the additional cost for moose habitat improvement is mini-

mal. For example, if firewood cutting removes trees greater than four inches in diameter, it is less expensive to use the hydro-axe to complete a moose habitat improvement project.

14-3b(2) Ruffed Grouse Habitat Management

Description. Improve ruffed grouse habitat on YTA. The ruffed grouse is an important small game species on Fort Wainwright, particularly on YTA. The Sikes Act and AR 200-3 requires the management of game species. Grouse habitat improvement also benefits other important game species, especially moose.

Methods. Clearing and thinning heavy brush and timber set back succession and provide habitat for important wildlife species, especially moose and ruffed grouse. Both species require lower successional stages for at least part of their ranges. On Fort Wainwright, clearings are more important on YTA than on the more open TFTA. USARAK has a plan[11] to improve ruffed grouse habitat on YTA. This proposed plan contains the following tasks:

- Determine ruffed grouse use areas. Heavy use areas will be determined through drumming counts and hunter survey data (Section 12-3a(4)). A special hunter survey will be used to specifically gather information on ruffed grouse.
- Evaluate habitat potential. Information from the first task will be used to select land tracts to implement habitat improvement. These tracts will be selected based on their capability to test three habitat improvement objectives:
  - increase brush and low-growing ground cover density for rearing broods and summer cover,
  - provide a mixed age-class of hardwoods for nesting and foraging
  - protect low-growing conifers for winter cover

The goal of treatments is to develop habitat units as described by Gullion (1984). The primary objective is to cut over-mature stands of aspens that are in the process of converting to a white spruce type. A checkerboard or other mosaic pattern is the objective, with each habitat unit being about five acres on a 50-year cutting cycle. Thus, a 50-acre tract would be divided into 10 habitat units, and one unit would be cut every five years. Five 50-acre tracts will be developed to provide for five acres (one habitat unit) to be cut each year, alternating among the tracts.

The hydro-axe and feller-buncher are the primary tools for brush and tree removal. The hydro-axe can sever trees up to eight inches in diameter. It works best on relatively level (< 5% slope) ground. The feller-buncher can cut and remove trees up to 20 inches in diameter (whole tree harvesting). The cost for either operation is about $85 per hour for equipment and operator. Another means to remove timber and brush is a bulldozer to snap off trees and other woody vegetation at ground level under frozen conditions. Cost is about $50 per hour. Another technique is manual tree or brush removal, probably via use of AFS fire crews as training projects.

This project is an offshoot of a 1995 AFS cut of about 25 acres in 12 patches of aspen in an area beside Quarry Road near the intersection of Manchu Road. This will be converted into the more formal system outlined above beginning in 1998. An early step will be the delineation of the other four 50-acre treatment blocks. Results will be used to determine changes to be made during the next revision of this INRMP.

14-3b(3) Duck Habitat Nesting Boxes

Description. Construct and maintain 100 nesting boxes for buffleheads (*Bucephala albeola*) and goldeneyes (*B. clangula*). Artificial nests are a habitat enhancement option for many wildlife species where nesting habitat is limited. This is the case with buffleheads and goldeneyes.

Methods. This project will require volunteers, a Boy Scout project or University of Alaska, Fairbanks, undergraduate project. Volunteers constructed ten nest boxes in 1996. The goal will be to construct and maintain 100 nesting boxes for buffleheads and goldeneyes on ponds, the Chena River, Salchaket Slough, and Clear Creek. Maintenance will include annual monitoring of box condition and use.

[11] Proposal, 10 March 1995, Yukon Training Area Ruffed Grouse Project, by Environmental Resource Division, DPW.

14-3b(4) Provide Owl Habitat Boxes

Description. Construct boreal owl (*Aegolius funereus*) nest boxes. Artificial nests are a habitat enhancement option for many wildlife species where nesting habitat is limited. This is the case with the boreal owl.

Methods. Nesting structures are an important aspect of the wildlife management program at Fort Wainwright. About 20 boreal owl nest boxes exist on birch trees on Birch Hill from a 1994 Eagle Scout project. USARAK has an objective to expand this program to 100 boxes by 1999 in Salchaket Slough, Clear Creek, and various lakes and ponds. This will require work by volunteers, due to in-house personnel limitations. Maintenance will include annual monitoring of box condition and use.

14-3b(5) Stream and Lake Habitat Improvement

Description. Determine the need for stream and lake habitat improvement. Fort Wainwright has no formal stream or lake habitat program. As part of its commitment to managing these resources (required by the Sikes Act and AR 200-3), USARAK needs to evaluate its need for such a program.

Methods. USARAK will consult with the ADF&G and conduct a literature search to determine the need for habitat improvement within its stream and lake ecosystems. If needed, a management plan will be developed and implemented.

14-3b(6) Prescribed Burning for Multiple Species Habitat Management

Description. Conduct prescribed burns to improve wildlife habitat. Section 13-3c includes a justification for prescribed burning to enhance wildlife habitat. The Sikes Act requires USARAK and BLM to manage wildlife habitat. Prescribed burning is one of the most effective and efficient means to enhance wildlife habitat on Fort Wainwright.

Methods. Section 13-3c describes use of AFS to accomplish prescribed burning on Fort Wainwright. This section includes planned burns primarily to fulfill the military mission and a burn primarily for grouse habitat enhancement. Experience and results of these burns will be used to plan additional wildlife habitat enhancement burns during 1998-2002. The 1996 burn on Stuart Creek and planned burns during 1998 on Stuart Creek and Manchu Range have reduced the need for burning these portions of Fort Wainwright over the next 15 years. The 1996 Stuart Creek burn was very spotty, and less than 30% of the area burned. This tends to create a good mosaic of conditions for wildlife, but it did not meet the objective of clearing the area for targetry work by the Air Force.

14-3b(7) Rights-of-way Habitat Management

Description. Adjust construction and maintenance practices involving rights-of-way on Fort Wainwright to improve wildlife habitat. Many wildlife species use open areas, such as found on rights-of-way, which often pass through a variety of habitats. Construction and maintenance of rights-of-way on Fort Wainwright offer opportunities to enhance wildlife habitat at little additional costs.

Methods. Rights-of-way are generally bladed to bare ground, which causes erosion in many areas and destroys wildlife habitat. If these areas were cleared and maintained with a hydro-axe or feller-buncher, erosion would be minimized, and wildlife habitat would be enhanced for many species. The Natural Resources Branch will coordinate with DPW planners and maintenance personnel to implement these changes during 1998-2002.

14-3b(8) Military Training Habitat Management

Description. Conduct up to 150 acres of military training habitat improvement each year during 1998-2002. Military facilities, such as drop zones, firing points, landing zones, landing strips, and firing ranges require little or no woody vegetation to conduct safe and realistic training. This project will allow maintenance of such areas to enhance habitat. Many wildlife species use open areas. Construction and maintenance of these areas on Fort Wainwright offer opportunities to enhance wildlife habitat at little additional cost.

Methods. Clearing and maintaining open areas with a hydro-axe or feller-buncher, instead of clearing with a dozer blade would minimize erosion and enhance wildlife habitat for many species. Prescribed burning should be conducted after clearing to select

for native grasses. The Natural Resources Branch will coordinate with DPW planners and maintenance personnel to implement these changes during 1998-2002.

14-3c Fish and Wildlife Population Management

Project description. Conduct fish and wildlife population management on Fort Wainwright during 1998-2002.

Project justification. The manipulation of populations is an important aspect of fish and wildlife management. The Sikes Act and AR 200-3 require fish and wildlife management.

Project prescription. Population management includes working with Alaska Department of Fish and Game to set game harvest levels and stock fish in rivers and lakes, controlling nuisance animals, conducting ruffed grouse reintroduction, and other projects to enhance game and non-game populations.

14-3c(1) Hunting, Fishing, and Trapping Harvest Management

Description. Manage the harvest of game, furbearers, and sport fish. Human use of sustainable resources is a critical aspect of ecosystem management. This includes hunting, fishing, and trapping on Fort Wainwright. The Sikes Act and AR 200-3 require the management of game, furbearers, and sport fish to ensure sustainability of harvests and protect the species involved.

Methods. Hunting, fishing, and trapping are allowed on Fort Wainwright under regulations promulgated by the ADF&G to ensure available habitat can support population numbers, as well as sustain recreational hunting demand. USARAK manages wildlife populations within these regulations.

USARAK collects post harvest data on game, furbearers, and sport fish, and provides it to ADF&G to assist the agency in promulgating species harvest regulations (Sections 12-3a(1-4) and (6-9)). USARAK manages hunting, trapping, and fishing on Fort Wainwright by designating areas available, establishing dates within ADF&G seasons, safety requirements, permit and reporting requirements, and other parameters to avoid conflicts with the military mission while providing safe, high quality recreational experiences (Chapter 17). USARAK collects data on species that are harvested, which is valuable for managing future harvests.

14-3c(2) Black Bear Sustainable Harvest Study

Description. Develop a sustainable harvest model for black bears on YTA. Hechtel (1991) studied black bears on Fort Wainwright from 1988 through 1991, concentrating on TFTA. Overall harvest was judged to be sustainable, although areas like YTA may have localized overharvest. There is little information on the YTA component of the Unit 20 black bear population. There is a theory that black bears who use bait stations in spring, such as in YTA, are mostly transients. This theory, if proven correct, would have a significant effect on harvest management decisions.

Methods. This study will use 20 radio-collared black bears to determine productivity, mortality, movements, home ranges, and habitat use on YTA. Additional bears will be ear-tagged to provide a larger sample size for mark-recapture population estimates. A model will be developed to estimate sustainable total harvest of black bears on Fort Wainwright. This project began in 1998 and is expected to be completed in 2000.

14-3c(3) Caribou Population Management

"We have abused both the herd and the land. The land is waiting for an apology. Until then, the herd will not be productive and give itself to people."[12]

Description. Participate in Fortymile caribou herd recovery by maintaining habitat quality, limiting effects of harvest on the herd, decreasing predation, monitoring plan effectiveness, increasing public awareness of the herd, and providing future planning processes. The *Fortymile Caribou Herd Management Plan* (Anonymous, 1995b) was developed to recover the herd, primarily for three reasons:

- Restore ecosystem biodiversity
- Provide opportunities for people to once again observe thousands of caribou crossing the Taylor Steese, and Top of the World highways

[12] elder Alex Van Bibber, Yukon

- Restore the traditional subsistence resource of this area

Methods. Means presented in the plan to achieve herd recovery include maintaining habitat quality, limiting effects of harvest on the herd, decreasing predation, monitoring plan effectiveness, increasing public awareness of the herd, and providing future planning processes. USARAK will provide support for the Fortymile Caribou Herd Recovery Plan during 1998-2002, recognizing the installation is on the fringe of the herd's range and based on available resources. Section 12-3a(9) describes USARAK's commitment to monitoring this herd should it begin to use Fort Wainwright in significant numbers.

Caribou have not been legal game on TFTA, but a season exists on YTA from August 10 through September 20 (in 1995). This is a permit-controlled hunt with a one-bull bag limit per permit. No caribou have been harvested from Fort Wainwright in recent years. Caribou hunting in Unit 20A (which includes TFTA) will start in 1998, using a permit-controlled hunt from August 10 to September 20.

14-3c(4) Fish Stocking

Description. Conduct fish stocking in accessible lakes on Fort Wainwright. Fish stocking is used to enhance human use (fishing) of sustainable natural resources, consistent with ecosystem management. It is an important aspect of fisheries management in Alaska. Fishing opportunities would be very limited without stocking. Fish stocking directly supports quality of life for the Fort Wainwright and local communities.

Methods. ADF&G, Fairbanks office, stocks Fort Wainwright through the Statewide Stocking Plan (Alaska Department of Fish and Game, 1996). The plan stocks River Road Pond (formerly called Wainwright #6 or Sage Hill Pond (3 acres)) and Monterey Pond every year, and Manchu Lake (43 acres) on alternate years. USARAK owns land in conjunction with Weigh Stations #1 and #2 ponds, just west of the highway near Badger Road. ADF&G stocks these ponds and they are used to support a kids' fishing derby.

There may be other opportunities for stocking fish on Fort Wainwright. Duck Pond (two acres) was formerly stocked with catchable rainbow trout, but this has been discontinued due to access restrictions to protect a USARAK cross-country trail. This restriction will be evaluated during 1998-2002 to attempt to return this pond to stocked status. Horseshoe Lake in YTA holds pike, but they are stunted. USARAK will work with ADF&G to remove stunted pike and add the lake to the stocking list. Blair Lakes might hold the same potential. During the next five years, USARAK and ADF&G will jointly evaluate other lakes and make stocking recommendations.

14-3c(5) Wildlife Transplanting and Stocking

USARAK is committed to preserving and enhancing biodiversity. Prior to any introduction of a new species to the post, appropriate NEPA documentation and consultation with partners of this INRMP will be completed. There are no current plans for transplanting wildlife either onto or from Fort Wainwright.

Table 14-3c(4). Planned stocking on Fort Wainwright for 1998-2002.

Location	Species	Size	1998	1999	2000	2001	2002
Manchu Lake	Arctic Char	Fingerling	0	8,600	0	8,600	0
	Rainbow Trout	Fingerling	0	8,600	0	8,600	0
River Road Pond	Grayling	Catchable	300	300	300	300	300
Monterey Pond	Rainbow Trout	Catchable	500*	2,000	2,000	2,000	2,000

* King salmon (8-12 inches) were stocked in 1998.

14-4 Wetlands Management

14-4a Create/Update Wetlands Management Plan

Project Description. Prepare, update and implement a wetland management plan for Fort Wainwright.

Project Justification. Implementation of an effective wetland management plan would maintain and enhance the health, productivity and biological diversity of wetland ecosystems. Management of wetlands is consistent with ecosystem management principles and is required by Executive Order 11990 (*Wetlands Management*), the Sikes Act, and AR 200-3.

Project Prescription. Complete a wetland management plan by 1999. It will be based on data obtained from the wetland survey (Section 12-2b).

14-4b Section 404 Consultation

Project Description. Consult with U.S. Army Corps of Engineers to obtain permits under Section 404 of the Clean Water Act. During FY 96, two wetland incidents nearly prompted the Corps of Engineers to issue USARAK notices of violation. Under this project, USARAK will obtain a general permit allowing training in low-function wetlands on Fort Wainwright and Fort Greely. USARAK will prepare and obtain individual permits outside the jurisdiction of the general permit. These permits are required under Section 404 of the Clean Water Act and AR 200-3.

Project Prescription. This consultation will include soil disturbance which affects wetlands. Permits involved include nationwide permits, individual permits (Section 14-4b(1), and a general permit (Section 14-4b(2).

14-4b(1) Obtain Individual Permits for Arctic Strike and Northern Edge

Description. Consult with U.S. Army Corps of Engineers to obtain permits to conduct Arctic Strike and Northern Edge military exercises on Fort Wainwright and Fort Greely. Permits are required under Section 404 of the Clean Water Act and AR 200-3.

Methods. This process will identify disturbed areas (trails, bivouac sites, ice bridge construction, etc.), map the disturbance, calculate fill or disturbed areas, and other information needed to apply for permits.The Corps of Engineers Regulatory Functions Branch issues permits.

14-4b(2) Obtain Five-Year General Permit

Description. Obtain a general permit to allow training in low-function wetlands on Fort Wainwright. Permits are required under Section 404 of the Clean Water Act and AR 200-3.

Methods. During 1999, USARAK will apply, obtain, and maintain a general permit to allow training in low-function wetlands on Fort Wainwright. The General Permit will authorize training exercises conducted in low-function wetlands. Therefore, USARAK policy will avoid impacting high-function wetlands as much as possible, to avoid obtaining individual permits.

14-4c Wetlands Management

Project Description. Manage wetlands on Fort Wainwright, including revegetation of those damaged by military training.

Project Justification. Wetlands are critical to the protection and maintenance of living resources as they provide essential breeding, spawning, nesting, and wintering habitats for a major portion of Fort Wainwright's fish and wildlife species. Wetlands also protect the quality of surface waters by impeding the erosive forces of moving water and trapping waterborne sediments and pollutants. They protect regional water supplies by assisting in the purification of surface and groundwater resources, and maintaining base flow to surface waters through the gradual release of stored flood waters. Wetlands also provide a natural means of flood and storm damage protection through the absorption and storage of water during high runoff periods.

Military training is conducted in areas that are classified as low-function wetlands. Under a general permit from the Corps of Engineers, wetland revegetation must take place when vegetation is disturbed as a result of training. Wetlands are regulated under Section 404 of the Clean Water Act, and manage-

ment and revegetation are required by reclamation plans in both the general permit (Section 14-4b(2)) and individual permits. Management of wetlands is required by Executive Order 11990 (*Wetlands Management*) and AR 200-3.

Project Prescription. Section 13-4, *Special Interest Areas,* includes provisions to protect the quality of wetlands at Fort Wainwright. These include using NEPA analysis to identify wetland conflicts with planned actions, and review of projects and activities involving wetlands. Additionally, other sections of this INRMP contain provisions for protecting water quality, which includes wetlands. Provisions are found within *Training Requirements Integration* (13-2b), *Land Rehabilitation and Maintenance* (14-5c), and *Erosion Control* (14-5b).

14-4c(1) Protect Wetlands

Project Description. Protect wetlands through planning, mapping overlays and coordination. The ongoing wetland delineation project (Section 12-2b) will improve wetland protection by making it easier to determine whether or not wetlands exist in any given location. This delineation will be followed by a classification system based on hydrogeomorphic characteristics of vegetative communities, including a description of values and functions of wetlands, along with management recommendations. All of this data will be used to develop a wetland management plan (Section 14-4a) in 1999.

Methods. NEPA analysis is the primary means to identify threats to wetlands on Fort Wainwright. NEPA requires that projects be evaluated for possible impacts. In most cases, the Natural Resources Branch makes the initial evaluation. Projects with potential impacts are referred to COE to determine if jurisdictional wetlands are implicated and to establish mitigation procedures.

In 1998-2002, USARAK will take the following measures to protect and manage wetlands on Fort Wainwright:

- Review all projects involving wetlands, using the NEPA process
- Encourage project managers to coordinate early with ERD to determine adverse impacts to wetlands
- Constrain development and training to avoid wetland impacts to the maximum extent possible and mitigate unavoidable impacts on wetland functions
- Continue restrictions on the firing of munitions into wetlands
- Incorporate wetland conservation education into Environmental Awareness programs
- Review and implement pertinent recommendations from the wetland study

14-4c(2) Mitigate Wetlands Damage

Project Description. This project will repair wetland damage from military activities required under the general and individual permits for training in wetlands. Military training is conducted in areas that are classified as low-function wetlands. Under a general permit from the Corps of Engineers, wetland revegetation must occur when vegetation is disturbed as a result of training. Wetlands are regulated by Section 404 of the Clean Water Act. General and individual permits require management and revegetation.

Project Prescription. Mitigation requirements will be outlined in reclamation plans within the general and individual permits.

14-5 Land Management

14-5a Erosion Control Management Plan

Project Description. Prepare, update, and implement an erosion control management plan for Fort Wainwright.

Project Justification. This plan is required to correct active erosion sites near sensitive areas such as streams and wetlands. This plan is required to stay in compliance with the Clean Water Act and the Sikes Act, which requires “no net loss” in the capability to support the military mission of Fort Wainwright.

Project Prescription. The erosion control plan will contain information on the location, extent, and severity of erosion sites as well as detailed scopes of

work necessary to repair the sites. This project will be completed by USARAK.

14-5b Erosion Control

Project Description. Control erosion on 75 acres on Fort Wainwright each year. Work is required to correct active erosion sites near sensitive areas such as streams and wetlands.

Project Justification. Erosion control is required by AR 200-3 to correct active erosion sites near sensitive areas such as streams and wetlands. This plan is required to stay in compliance with the Clean Water Act and the Sikes Act, which requires "no net loss" in the capability to support the military mission of Fort Wainwright. Projects are intended to complement the LRAM component of ITAM, not duplicate training area repair.

Project Prescription. Installation sources of dust, runoff, silt, and erosion debris will be controlled to prevent damage to land, water resources, equipment, and facilities, including those on adjacent properties. A protective vegetative cover will be maintained over all compatible areas. Use of bioengineered erosion control practices will be used when possible. Live plantings, root wads, coir logs, and spruce tree revetments provide erosion protection and habitat for fish and wildlife. Other materials that may be used include gravel, fabrics, mulch, rip-rap, recycled concrete and pavement that is environmentally safe and compatible with the site. When bare ground is required to accomplish mission objectives, other soil conservation measures will be used to control dust, erosion, and sedimentation. Physically intensive, land-disturbing activities should be sited on the least erodible lands to minimize land maintenance expenditures and help ensure environmental compliance. The potential erodibility of sites and locations of adjacent wetlands will be identified and analyzed in all prepared plans for development, training, and other land uses.

Erosion control is also incorporated in the LRAM section (Section 14-5c) under maintenance and rehabilitation of training lands. It is also associated with water pollution (environmental compliance) and road maintenance.

Most erosion control not associated with LRAM on Fort Wainwright involves road drainage correction or maintenance. Road drainage maintenance is important for controlling sedimentation in run-off. Road maintenance on training lands is generally the responsibility of DPW. However, the 47th Combat Engineers also provide considerable road maintenance. In addition, USAF maintains roads in YTA for access to its equipment.

When roads are repaired, drainage problems should be corrected. However, range road maintenance at Fort Wainwright, like many other Army posts, is backlogged due to budget cutbacks and higher priorities within the cantonment area. Thus, road drainage is often inadequate for proper distribution of run-off. Road damage can occur in a short period of time, especially during spring breakup. Therefore, it is difficult to establish long-range priorities for correcting road erosion. Individual erosion control projects are described below.

14-5b(1) Manchu Lake Erosion

Description. Develop and implement a plan to repair erosion on Manchu Lake. Manchu Lake is an important resource to military training and recreational fishing on Fort Wainwright. Its' west bank is eroding to the point where the road is threatened and fish are escaping the pond.

Methods. The full extent of damage to the lake will be determined as part of the planning process. A plan will be developed by 1999 and implemented as soon as possible.

14-5b(2) Erosion Along Chena River

Description. Develop and implement a plan to repair erosion sites along the Chena River on Fort Wainwright. The Chena River is an important resource that directly contributes to the quality of life for the Fort Wainwright and surrounding communities. Heavily used portions of this river have significant bank erosion. The Clean Water Act requires repair of erosion sources.

Methods. The full extent of damage to the river bank will be determined as part of the planning process. A plan will be developed by 1999 and implemented as soon as possible.

14-5c Land Rehabilitation and Maintenance

Project Description. Implement the Land Rehabilitation and Maintenance (LRAM) program, a component of ITAM, to maintain quality military training lands and to minimize long-term costs associated with land rehabilitation.

Project Justification. LRAM is necessary to maintain a realistic training environment for soldiers and to comply with the Sikes Act requirement for "no net loss" in the capability of Fort Wainwright to support its military mission.

Project Prescription. LRAM involves repair of damaged lands and use of land construction technology to avoid future damage to training lands. LRAM uses technologies, such as revegetation and erosion control techniques, to maintain soils and vegetation required for accomplishment of the military mission. LRAM includes programming, planning, designing, and executing land rehabilitation, maintenance, and reconfiguration projects based on requirements and priorities identified in the TRI component of ITAM (see Section 13-2b).

Construction and maintenance of winter roads are important considerations on Fort Wainwright. Military units must be able to move from place to place when the ground is frozen. A report, *Building and Operating Winter Roads in Canada and Alaska* (Adam, 1978), has useful information regarding this topic. This information will be used to help design and implement projects associated with roads on Fort Wainwright.

14-5c(1) Land Rehabilitation and Maintenance Management Plan

Description. Develop a five-year LRAM management plan. Benefits to training include identification, delineation, and scoping of LRAM projects to be conducted from 1998 through 2002.

Methods. USARAK will cooperate/contract with ADNR Plant Materials Center to develop and write the plan in 1998.

14-5c(2) MOUT-MAC Site

Description. Revegetate the MOUT-MAC training facility on YTA. The facility is unavailable for use during break-up (1 April-15 May). Use during the remainder of the year continues to degrade the site. Benefits to training include increased number of days during the year the facility can be used, lower LRAM maintenance costs, and a more realistic training facility.

Methods. The project includes revegetating berms, repairing and revegetating 10 acres near military facilities, and hardening bivouac areas next to the site in Yukon Training Area 4.

14-5c(3) Assault Airstrip Training Site

Description. Repair and revegetate areas surrounding the assault airstrip on Johnson Road, Yukon Training Area 4. The area directly surrounding the assault airstrip is being degraded by encroachment from vehicular traffic from the road, causing erosion. Benefits to training include increase in soldier-use days of the assault airstrip, improved access to the facility, and cost avoidance in the future for major airstrip repair.

Methods. This project includes revegetating approximately 20 acres surrounding the Firebird Assault Airstrip. The first phase of the project involves grading to level the site and remove small gullies originating near the airstrip. The second phase includes fertilizing and seeding unvegetated areas.

14-5c(4) Husky Drop Zone Access

Description. Improve the maneuver corridor to Husky Drop Zone and bivouac areas. The maneuver corridor is impassible from 15 April through 1 October. Training is only possible in winter when the road is frozen. Benefits to training include improved access to Husky DZ and Yukon Training Area 1, and increased possible soldier-use days in Yukon TA 1.

Methods. This project includes upgrading the southern access to Husky Drop Zone and closing and revegetating the northern access. The first phase of the project is a study to determine if there are native materials available to repair the Husky Drop Zone access. The second phase of the project will obtain a wetland permit to repair the access. The third phase will regrade, improve, and resurface portions of the southern access. The fourth phase of the project will

revegetate and close the north access. Revegetation will use native wetland plants and shrubs.

14-5c(5) Manchu Lake Training Site

Description. Repair, revegetate, and improve access to Manchu Lake training site, Yukon Training Area 2. Manchu Lake training site is inaccessible during summer and break-up. Benefits to training include increased access and increase in soldier-use days.

Methods. The first phase of this project will identify all areas around Manchu Range that are used as bivouac areas. The second phase will improve access into the bivouac sites. The third phase will harden the bivouac areas by providing an all-weather surface to trails and tent sites.

14-5c(6) Local Training Area 101

Description. Repair maneuver damage, fill trenches and foxholes, and remove trash in Cantonment Training Area 101. Training Area 101 is unsafe for night maneuvers due to unfilled trenches and unmarked concertina wire. Benefits to training include a more realistic training resource, increased training safety, and fewer animal conflicts due to trash.

Methods. This project will survey the entire training area to identify and locate unfilled foxholes and trenches, trash, wire, and other debris. All foxholes, trenches, and defilades will be filled and revegetated. All trash, wire and other debris will be removed.

14-5c(7) Engineer Camp Bivouac Site

Description. Harden bivouac site and improve access into Engineer Camp, Yukon Training Area 2. Engineer Camp can only be used in the winter without creating significant damage. Benefits to training include increased accessibility and year-round usage.

Methods. Phase 1 will obtain a wetland permit to implement the project. Phase 2 will improve and repair access into Engineer Camp by repairing and resurfacing 300 meters from Manchu Road into Engineer Camp using geotextiles overlain by gravel. Drainage from the accessway will be improved to prevent future problems. Phase 3 will improve trails throughout the bivouac site. Phase 4 will harden tent pads throughout the bivouac area.

14-5c(8) Small Arms Range Access

Description. Improve access to small arms ranges. Regular maintenance of ranges is impossible during certain times of the year. Benefits to training include increased access by range personnel resulting in fewer lost soldier days on small arms ranges.

Methods. Approximately five acres will be hardened and repaired. The access road will be repaired and resurfaced to provide access for repair of small arms ranges. Berms at the back of the ranges will be revegetated.

14-5c(9) Training Area 102

Description. Repair maneuver damage, fill trenches and foxholes, and remove trash in Training Area 102. Benefits to training include a more realistic training resource, increased training safety, and fewer animal conflicts due to trash.

Methods. This project will survey the entire training area to locate unfilled foxholes and trenches, trash, wire, and other debris. All foxholes, trenches, and defilades will be filled and revegetated. All trash, wire, and other debris will be removed.

14-5c(10) Training Area 104

Description. Repair maneuver damage, fill trenches and foxholes, and remove trash in Training Area 104. Benefits to training include a more realistic training resource, increased training safety, and fewer animal conflicts due to trash.

Methods. This project will survey the entire training area to locate unfilled foxholes and trenches, trash, wire, and other debris. All foxholes, trenches, and defilades will be filled and revegetated. All trash, wire, and other debris will be removed.

14-5c(11) Training Area 105

Description. Repair maneuver damage, fill trenches and foxholes, and remove trash in Training Area 105. Benefits to training include a more realistic training resource, increased training safety, and fewer animal conflicts due to trash.

Methods. This project will survey the entire training area to locate unfilled foxholes and trenches,

trash, wire, and other debris. All foxholes, trenches, and defilades will be filled and revegetated. All trash, wire, and other debris will be removed.

14-5c(12) Training Area 106

Description. Repair maneuver damage, fill trenches and foxholes, and remove trash in Training Area 106. Benefits to training include a more realistic training resource, increased training safety, and fewer animal conflicts due to trash.

Methods. This project will survey the entire training area to locate unfilled foxholes and trenches, trash, wire, and other debris. All foxholes, trenches, and defilades will be filled and revegetated. All trash, wire, and other debris will be removed.

14-5c(13) Training Area 107

Description. Repair maneuver damage, fill trenches and foxholes, and remove trash in Training Area 107. Benefits to training include a more realistic training resource, increased training safety, and fewer animal conflicts due to trash.

Methods. This project will survey the entire training area to locate unfilled foxholes and trenches, trash, wire, and other debris. All foxholes, trenches, and defilades will be filled and revegetated. All trash, wire, and other debris will be removed.

14-5c(14) Training Area 108

Description. Repair maneuver damage, fill trenches and foxholes, and remove trash in Training Area 108. Benefits to training include a more realistic training resource, increased training safety, and fewer animal conflicts due to trash.

Methods. This project will survey the entire training area to locate unfilled foxholes and trenches, trash, wire, and other debris. All foxholes, trenches, and defilades will be filled and revegetated. All trash, wire, and other debris will be removed.

14-5c(15) Training Area Clean-up

Description. Assist Range Control with the annual Fort Wainwright range clean-up program. Maintaining Fort Wainwright's range areas as litter-free environments is an aspect of land stewardship that directly supports the military mission and enhances the quality of outdoor recreation aesthetics.

Methods. Natural resources personnel often travel to more off-road locations than Range Control personnel, and are likely to discover debris and litter (drums, wire, garbage, etc.) on an opportunistic basis while performing other activities. Natural resources personnel will compile a list of trash items and their locations during the year. In some cases, personnel will move these items to roads for later pickup by clean-up crews (as part of LRAM). Lists of nonhazardous materials will be provided to Range Control to be included in the annual May clean-up. Drums of materials or other potentially hazardous materials will be reported to Environmental personnel. Natural resources personnel will assist Range Control with a post clean-up inspection.

14-6 Improved Grounds Management

This section includes management of the cantonment area that directly affects natural resources management. Routine grounds maintenance on Fort Wainwright is handled primarily by Grounds Maintenance, DPW. The *Installation Design Guide* (Higginbotham/Briggs & Associates, 1991) and the *Landscape Design Plan* (David Evans and Associates, Inc., 1987) provide information on using trees and shrubs for landscaping. Both documents provide lists of plant materials appropriate for use on Fort Wainwright.

Routine grounds maintenance is not included in this INRMP unless it is specifically designed to benefit natural resources. Natural resources personnel provide professional assistance for landscaping, particularly regarding species selection and care of the landscape. In 1996, ERD produced a *Landscape and Planting Guide* (Fort Wainwright, 1996).

14-6a Improve Urban Landscape

Project Description. Improve the urban landscape at Fort Wainwright during 1998-2002.

Project Justification. Designation as Tree City U.S.A. would be recognition of USARAK's efforts to use trees as a major component of landscaping on Fort Wainwright. Publicity generated would improve the overall image of the installation.

Project Prescription. USARAK is well aware of its responsibilities as outlined in the White House Memorandum, *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds* (Office of the President, 1994). Specific requirements include:

- Landscaping with regionally native plants
- Construction practices that minimize adverse effects on the natural habitat
- Reducing fertilizer and pesticide use thereby reducing pollution, using integrated pest management, recycling green waste, and minimizing runoff
- Implementing water-efficient practices
- Creating demonstrations of these practices to promote their use elsewhere

During 1998-2002, USARAK will select plants from the list in Chapter XVIII of the *Landscape and Planting Guide* (Fort Wainwright, 1996). Commercial sources for plant materials may be obtained from the *Directory of Alaska Landscape Plant Sources* (Alaska Plant Materials Center, 1994).

14-6a(1) Tree City USA

Description. Achieve designation of Fort Wainwright as a "Tree City U.S.A."

Method. Tree City U.S.A. designations are conferred by the National Arbor Day Foundation. This status depends upon an Arbor Day celebration with a proclamation by the Commanding General, a professional forestry department, and a commitment to spend at least $2.00 per capita on tree management. In 1998-2002, designation requirements will be met by the Fort Wainwright community.

14-6a(2) Landscaping

Project Description. Develop and implement a program for landscaping on Fort Wainwright that improves the community quality of life and supports natural resources. The *Landscape and Planting Guide* (Fort Wainwright, 1996) lists the following benefits of proper landscaping:

- Removal of airborne particulates from the atmosphere
- Removal of carbon dioxide and providing oxygen
- Reduction of noise and dust
- Creation of wildlife habitat
- Creation of windbreaks, shade, and privacy screening
- Reduction of snow in protected areas
- Increased energy efficiency
- Increased property values

Methods. Whenever possible, USARAK will use native species from surrounding areas in its urban landscaping effort. Plants from areas other than north of the Alaska Range are too much of a risk in terms of long-term survival and maintenance. The possibility of transplanting trees and shrubs from construction sites or training areas will be considered during the next five years. This would provide plants suited to the area, and could prove very cost effective, especially for smaller sites.

The *Landscape and Planting Guide* (Fort Wainwright, 1996) describes characteristics used to select plants. This discussion includes evergreen vs. deciduous; trees vs. shrubs; shape, texture, and color; and plant roles in landscape design. Environmental factors to consider include climate, permafrost, and soils.

USARAK will use the *Landscape and Planting Guide* (Fort Wainwright, 1996) during 1998-2002 for guidance with planting, transplanting, and maintaining landscape materials. This document describes the need for watering due to the nature of soils, problems with fill material around new plantings, and timing, size, digging, transporting, soil preparation, planting, fertilizer, mulching, pruning, and staking requirements. It also describes maintenance of landscape plantings.

The *Landscape and Planting Guide* (Fort Wainwright, 1996) describes factors that should be considered when designing a landscape. Items included are infrastructure, the need for informal design as opposed to formal lines of uniform plants, creation of islands that also provide habitat for wildlife, prob-

lems with overhanging electric wires, snow removal considerations, and northern vs. southern exposure considerations. The use of habitat islands to replace mowed areas is not only attractive to wildlife, but also saves maintenance money.

The planting guide describes landscaping strategies for specific areas on Fort Wainwright. These strategies will be used for landscaping decisions during the next five years. Specific areas are:

- Family housing and office buildings
- Monterey Lake
- Industrial areas
- Bassett Hospital
- Gaffney Road
- Neely Road/Meridian Road

14-6b No-Mow Program

Project Description. Use the no-mow strategy to reduce costs and improve wildlife habitat on Fort Wainwright.

Project Justification. No-mow saves money. Fort Sill, Oklahoma calculated savings to be about $10,000 annually for each 100 acres removed from mowing. Similar savings are possible at Fort Wainwright and are consistent with drastically reduced installation budgets within the Department of Defense. No-mow, when properly designed, improves urban wildlife habitat, which can improve the quality of life for the Fort Wainwright community by increasing opportunities to observe wildlife.

Project Prescription. No-mow means the dropping of an area from the grass mowing cycle. No-mow areas are most accepted by the public when they are natural extensions of already wild lands, such as narrowing a mowed road shoulder or extension of a woody area into a field.

This "growing wild" phase of reduced grounds maintenance is not without its problems. During the first season, some areas may be somewhat unsightly due to growth of undesirable plants. Herbicides may be needed to eliminate early invader exotic species and to promote faster recovery of native vegetation. Herbicide use, particularly spot treatment, may cause some temporary eyesores. There are also increased pest problems associated with wildlands being closer to buildings. Experience on other installations has shown that these problems are relatively minor.

The initial effort on Fort Wainwright will be delineating areas where no-mow can be effectively used. This will require coordination with maintenance personnel within Public Works. Areas designated for no-mow will be dropped from the regular mowing schedule. Fort Richardson establishes tree lines in front of areas to be removed from mowing, thus effectively moving unimproved grounds inward. This tactic could also be used at Fort Wainwright. Another tactic is to plant trees on vacant lots created by building demolition. Natural rock and raised mounds could also be used to create highly aesthetic no-mow areas.

14-6c Training Debris Clean-up

Project Description. Remove training debris from areas within the cantonment area that are being used for training.

Project Justification. Areas within or near the cantonment area (such as behind the Club Oasis, the wooded area of the new golf course, the old rappel site, and north of Birch Hill) have been, or are being, used for unauthorized training and various types of debris have been left in the field. These are unsightly, detract from the quality of life, and in some cases, pose safety hazards.

Project Prescription. USARAK command will prioritize this project for the 1999 post spring clean-up. Debris to be removed include trip wire, barbed wire, barrels, etc. Natural resources personnel will provide a list of locations and typical debris to Range Control for coordination of this soldier project.

14-7 Pest Management

DPW is responsible for pest management, specifically the Certified Pest Controller. Other organizations on post involved include PMO Game Wardens and DPW Environmental Resources. The Pest Management Coordinator position for USARAK is within the Natural Resources Branch, DPW, at Fort Richardson. The coordinator is not involved in rou-

tine pest management operations, but serves as a technical advisor to the program.

14-7a Measures of Merit

Project Description. Fulfill requirements defined by the Army pest management program measures of merit.

Project Justification. The Army approved three measures of merit in 1994 for USARPAC installations. They effectively define the course of pest management programs.

Project Prescription. These measures are: to have a current pest management plan by the end of FY 97, to reduce pesticide use by 50% over a seven-year period (1994-2000), and to have pesticide applicators certified within two years of employment by end of FY 98. As described below, USARAK will work to meet or maintain compliance with these measures of merit during 1998-2002.

14-7a(1) Integrated Pest Management Plan

Description. Maintain and update the Integrated Pest Management Plan. Completion and updates to the Plan are required to meet USARPAC pest management measures of merit. The installation has a current Pest Management Plan (Hill, undated). The plan includes YTA, which fulfills the requirement of the *YTA Resource Management Plan* (BLM and U.S. Army, 1994) that all herbicides and pesticides used on YTA are applied in accordance with the Fort Wainwright Pest Control Plan and all applicable laws and regulations.

Methods. USARAK has completed its Pest Management Plan (Hill, undated) for Fort Wainwright. The plan will be maintained and updated as needed during 1998-2002. The primary goal of the plan is to minimize adverse environmental impacts of pesticide use while achieving an acceptable level of pest control and cost-effectiveness by:

- Use of alternative strategies (sanitation, trapping, biological control, mechanical control, etc.)
- Selection of least toxic pesticides
- Selection of precision application techniques that target specific pests and habitats
- Emphasis on education, communication, monitoring, inspection, and record keeping

The Pest Management Plan includes an inventory of pesticides and equipment, pesticide spill emergency procedures, workload definition worksheets, hazardous materials and waste SOP, and pesticide application SOP. The Pest Management Plan has an accompanying environmental assessment.

14-7a(2) Reduced Chemical Use

Description. Reduce pesticide use after adequate pest and vegetation control is achieved, most likely after 1998. Reductions in pesticide use are required to meet USARPAC pest management measures of merit.

Methods. All chemicals used on Fort Wainwright are Environmental Protection Agency (EPA) approved. Reduced chemical use is a primary goal of the pest management program. The installation understands the obvious and long-term threats to humans and ecosystem functions from chemical abuses.

However, special circumstances at Fort Wainwright require a delay or modification of the goal to reduce pesticide use by 50% from 1993 levels. The Pest Control shop had as many as five personnel until cutbacks began in the 1980s. By 1986, the operation was reduced to a single pest controller, and it remained at this level until 1996. Due to a tremendous buildup of pests and undesirable vegetation, two pest controllers were added to the staff in 1996. Thus, the period of 1996 through at least 1998 has increased the amount of pesticides used on Fort Wainwright, especially herbicides and soil sterilants. After the backlog is removed, and pests and undesirable vegetation are brought under reasonable control, pesticide use will be reduced. However, it is unlikely that it will reduce 1993 levels by 50% since pest control was inadequate in 1993.

14-7a(3) Applicator Certification

Description. Provide refresher training for Pest Control personnel certified for pesticide handling. Certification and maintaining certification for Pest Control personnel at Fort Wainwright are required to meet USARPAC pest management measures of merit.

Methods. The Pest Control supervisor has been certified for many years, and the two new pest controllers were certified in the fall of 1996. These personnel will recieve required refresher training, and new personnel will receive certification training. USARAK has the option to use a combined Army, Navy, and Air Force pesticide training facility in Hawaii or the Army school at Fort Sam Houston, Texas.

14-7b Noxious Plant Control

Project Description. Control noxious plants within the cantonment area.

Project Justification. Dandelions (*Taraxacum sp.*) are a major weed problem on Fort Wainwright, especially in the past few years due to cutbacks in noxious plant control. There is a significant backlog in woody plant control, especially on rights-of-way.

Project Prescription. Noxious plant control is primarily the responsibility of the Pest Controller, DPW, at Fort Wainwright. The Pest Controller is also responsible for the golf course. Proper turf management by golf course personnel has minimized turf diseases on the golf course.

The tactic normally used to control dandelions is to apply a liquid broadleaf herbicide early in the growing season with a "weed and feed" granular herbicide/fertilizer mixture used later in the growing season. There were significant increases in the use of herbicides to control woody vegetation on rights-of-way during 1996-1998. Soil sterilants are used to control weeds in railroad ballast, along runways, at electrical transformer sites, along fence lines, around targets, on small arms firing lines, at hand grenade ranges, and at similar sites where bare ground is either required or not objectionable. The area of greatest concern during pest control activities is the Chena River. Potential impacts to the Chena River will be considered prior to and during herbicide use. When possible, use of herbicides will be avoided.

14-7c Pest Animal Control

Project Description. Control pest animals on Fort Wainwright.

Project Justification. Below are brief descriptions of pest animal issues on Fort Wainwright:

- Generally, stray pets are a minor problem at Fort Wainwright.
- Common household and nuisance pests include German and smokey brown cockroaches (the most common pests on the post), silverfish, spiders, fleas, beetles, hornets, wasps, and other occasional intruders. During the summer, clover mites and spiders occasionally are problems in troop barracks and Murphy Hall. During summer, wasps are a significant problem.
- Beavers create problems on Fort Wainwright with regard to blocking flood control channels and damaging other earthworks. They also destroy valuable trees, which is especially noticeable on the golf course.
- Road-killed moose must be removed as soon as possible, especially if they are in the cantonment area.
- Cliff swallows are a problem within the cantonment area. Swallows often build their nests under eaves of buildings, including residences. This creates a nuisance and health concern. Droppings are unsightly and are a growth medium for a fungi which causes respiratory infection (histoplasmosis). Swallows can also be infested with mites.
- Another bird problem is pigeons in aircraft hangers. Pigeons roost above parked aircraft, and their droppings create maintenance and human health problems.
- Scale insects, aphids, and other pests of trees and ornamentals are significant on Fort Wainwright only during significant population outbreaks of these pests.
- Real property pests include carpenter ants and decay fungi, neither of which has been a major concern at Fort Wainwright.
- Mosquitos, biting gnats, and flies are common pests during warm months.

There are occasional other pest animal problems on Fort Wainwright. Pests must be controlled for a variety of reasons, including human health, protection of property and foodstuffs, protection of desired vegetation, safety, and general quality of life.

Project Prescription. Noxious animal control responsibility is shared at Fort Wainwright. In general, Pest Control Branch, DPW, and the Provost Marshal work within the cantonment area. The Provost Marshal assisted by ADF&G and Alaska State Patrol, handle problems with game animals. Animal Damage Control (ADC), U.S. Department of Agriculture, has skills that may be useful in controlling noxious animals. USARAK will use ADC on a reimbursable basis as required during the next five years.

Domestic Pets. Cats and dogs running loose within the cantonment area and on the range are generally the responsibility of the Provost Marshal using road patrol personnel. Neither Military Police road units nor Military Police game wardens have access to tranquilizer guns, so slip nooses are generally used. The Pest Controller traps feral cats on an as-needed basis.

Household and Nuisance Pests. Pest Control handles general household and nuisance pests on Fort Wainwright. An integrated approach is used for removal of these pests, including education, sanitation, and chemical control. Removal of wasp nests, and aerosol sprays are used in problem areas.

Beavers. Beaver damage is primarily controlled through trapping beavers. State of Alaska special depredation permits are issued to individuals interested in trapping beavers on Fort Wainwright. In 1995-1996, eight permits were obtained. The Pest Controller also traps or shoots problem beavers.

Road-killed Moose. Military Police game wardens are called to handle road-killed moose. If carcasses are still safe for human consumption, they are donated using a charity list.

Birds (except BASH). Exclusion of birds from nesting sites is the preferred means to control cliff swallow nesting activity. Sometimes it is necessary to destroy nests; this may include eggs or young. Fort Wainwright will obtain the proper USFWS permits prior to nest removal. They will use early detection and action to avoid destruction of nests with young or eggs.

There are numerous ways to deal with pigeon problems, depending on location. Each case is evaluated individually and appropriate action is taken. In general, screening is the preferred method to keep pigeons from hangers. However, in 1995 it was necessary to trap pigeons with 287 being captured.

Ornamental and Tree Pests. The use of insect resistant trees and ornamentals prevents outbreaks.

Real Property and Stored Product Pests. Control of real property pests is on an as-needed basis. Alaska Veterinary personnel, MEDDAC, inspect for stored product pests except in Housing, where the Pest Controller has inspection responsibility. Infestations are controlled by DPW. Subsistence items are often shipped by rail, and they may be treated in transit. Fumigated railcars must be opened and neutralized by certified pest controllers.

Disease Vectors. The Alaska Preventative Medicine Branch, MEDDAC, and DPW Entomology are responsible for mosquito surveillance and determination of the need for control. Control is the responsibility of DPW and includes elimination of mosquito breeding areas and use of pesticides when needed. Ultra Low Volume insecticide treatments of *Pyrenone* are recommended. Flies are normally treated using sanitation practices. The area of greatest concern during some pest control activities is the Chena River. Potential impacts to the Chena River will be considered prior to and during mosquito control activities.

Predator Control. Alaska Administrative Code (5 AAC 92.110) allows the Commissioner of ADF&G to implement wolf population reduction under certain conditions. It is not anticipated USARAK will need to request approval for wolf population control from ADF&G on its lands during 1998-2002. Predator control on Fort Wainwright must be approved by USARAK and evaluated using the NEPA process.

Other Animals. Pest Control handles most other animal problems. These include rodents, shrews, and mice in stored food or other occupied places; woodchucks in lawns; wild animals in housing; etc. Each problem is evaluated individually. Military Police

game wardens or the Pest Controller handle wildlife control problems, such as squirrels, bears, and foxes. Woodchucks occasionally cause problems, and offenders are trapped by the Pest Controller and released at Creamer's Field.

14-7d Bird-Aircraft Strike Hazard (BASH) Management

Project Description. Conduct Bird Air Strike Hazard (BASH) program on Fort Wainwright. Early BASH efforts were geared toward reduction of gulls near Wainwright Army Airfield. Gulls were attracted to the airfield by grasshoppers. Aviation command did not cut the grass on the airfield during 1995, and no bird strikes occurred that year. Airfield Operations and the Alaska Fire Service conduct bird hazing at Wainwright Army Airfield with occasional assistance from the post biologist.

A USARAK Natural Resources biologist has assisted with BASH guidelines for Fort Greely, Fort Wainwright, and the Alaska National Guard at Fort Richardson. The Fort Wainwright BASH team is comprehensive, including USARAK Aviation, Fort Wainwright Commander, DPW, aviation units, Airfield Operations, Public Affairs Office (PAO), Golf Course Manager (the golf course is in the flight line), PMO, tower personnel, and AFS (which uses Wainwright Army Airfield).

Project Justification. On September 22, 1995, Alaska discovered the hazards of birds in areas used by aircraft. An Elmendorf AFB AWACS radar surveillance jet crashed with the loss of all aboard. Geese were identified as the cause of the crash. This crash added a sense of urgency to ongoing efforts to develop a Bird Aircraft Strike Hazards (BASH) program for Wainwright Army Airfield. The Airfield runway is in a flyway for Canada geese, and bird hazards exist. The Sikes Act and AR 200-3 require bird population management. In addition, the Alaska Command mandated that all military bases with airfields in Alaska establish BASH programs. As a result, these airfields now have SOPs that include BASH protocols.

Project Prescription. The BASH program will develop ways of reducing the air strike hazard by manipulating habitat to decrease the number of birds near the runway. The role of the Natural Resources Branch is to provide technical expertise and make recommendations to Public Works, USARAK Aviation Safety, Airfield Operations, and the Pest Control Branch to reduce bird use of critical areas. Pest Control also monitors birds identified by BASH (Section 12-3a(5)), and is responsible for obtaining depredation permits for the destruction of gulls and their eggs. The BASH program includes the following features:

- Continue depredation on key nuisance species. The Pest Management program will repair or place wire on hangers where swallows and pigeons are roosting or nesting.
- Work with all area airfield managers to establish like-minded BASH programs. The Air Force will be using Fort Wainwright and Fort Greely airfields beginning in FY 2000. This will require coordination to ensure Army airfields meet Air Force BASH standards.
- Produce educational materials for BASH, including videos, posters, handouts, training, bird books, binoculars, etc.
- Continue to purchase equipment used to keep birds off the airfield.
- Continue to purchase barley (seed or bait) for Creamers Field to attract birds away from Wainwright Army Airfield.
- Attend BASH training workshops and other similar opportunities.

14-8 Spatial Information Management

A Geographic Information System (GIS) is a computerized system for the collection, storage, manipulation, and output of spatially referenced information. Fort Wainwright's natural resources and military use spatial data are managed within the USARAK GIS system located at Fort Richardson. This system is a network of digital databases that supports administrative and management objectives affecting all aspects of USARAK controlled lands. The GIS laboratory provides customers with hardcopy maps, statistical information, software support, training, and custom software interfaces that

complete pre-defined tasks and allow access to on-line digital databases for display and query purposes.

The USARAK GIS system consists of three SUN® Workstations (Ultra® 1, Ultra® 2, and Sparc® 2) running Solaris® version 2.5.1 for desktops. Total hard drive storage is approximately 4 gigabytes with each workstation having 64 megabytes of RAM. Of the Ultra® workstations, only the Ultra® 1 came equipped with internal 3.5" floppy and CDROM drives. For data exchange and backup purposes, an external 8mm-tape drive resides on the Ultra® 2. Attached to the Ultra® 1 is an Altek® 36" X 48" digitizing board for data input. An HP 650C 36" color plotter is available to all networked computers for map production.

The primary GIS software packages are Earth Systems Research Institute (ESRI) ArcInfo® 7.1 and ArcView® 3.1; both are vector-based systems that can incorporate raster functionality. USARAK has one licensed copy of ArcInfo® resident on the system. To access ArcView® or multiple copies of ArcInfo®, the Center for Ecological Management of Military Lands (CEMML) licenses are accessed via the network. ERDAS Imagine® 8.3, a raster-based GIS software, is also available on the USARAK system.

14-8a Upgrade GIS System

Project Description. Upgrade the USARAK GIS system to meet current and near-future demands.

Project Justification. The current hard drive's storage capacity is easily depleted by raster-based modeling and vector storage. The USARAK GIS lab will be unable to acquire and process additional orthorectified images, digital raster layers, or vector data without additional hard drive space. The USARAK GIS server (Ultra® 2) has memory performance problems associated with a lack of RAM. Without an increase in RAM, the system will not support additional users, creating an ineffective and inefficient server. In addition, another workstation is required to free-up resources on the Ultra® 2 so it can function exclusively as the data, print, and Intranet server. A CDROM writer is necessary to provide other organizations with requested data. Most computers come equipped with a CDROM, making it more efficient to supply requested data on this medium. Access to CEMML software licenses is tenuous due to frequent interruptions in network connectivity. Consequently, purchase of GIS software to be resident on the local system is necessary to prevent GIS operator downtime. The upgrade from a desktop version of Solaris® to a server version will improve management of computer resources.

Currently, only Fort Richardson natural resources personnel can access the USARAK GIS system. Once the GIS database server is operational, then access to all interested parties throughout USARAK via network will be available. After this connection is established, data transfer between Fort Wainwright and Fort Richardson will be seamless. Where once GIS software was cumbersome and only able to operate on a UNIX workstation, today's software is portable and easy to use on a desktop PC.

As various organizations within USARAK become aware of the information residing on the database and its possibilities, they will desire access. Consequently, one area for future expansion includes the capability to train and offer software support to potential GIS software users. Ultimately, the goal is to package a training course along with necessary hardware upgrades and software purchases to bring data and output capabilities to users desktops.

Project Prescription. The most urgent need is to increase hard disk storage and the amount of RAM on the Ultra® workstations. An additional workstation is required to serve as a desktop unit for one of the GIS operators. To facilitate data exchange between USARAK and other governmental and civilian organizations, a CDROM writer is essential. Additional copies of ArcInfo®, ArcView®, and a server version of Solaris® are needed to eliminate downtime resulting from interruption of network connectivity with CEMML. Below is specific information on this project:

- Upgrade Hardware - Purchase 36 gigabytes of hard disk storage. Purchase additional RAM for a minimum total of 256 megabytes for the Ultra® 2 Workstation. Purchase new SUN Ultra® 30 workstation. Purchase CDROM writer.

- Upgrade Software - Purchase a three-user license of ArcInfo® and ArcView®. Purchase a server version of Solaris® to replace current desktop version.
- Expand Use to Fort Wainwright - To facilitate Fort Wainwright's use of the GIS, the Sparc® 2 will be transferred to Fort Wainwright. The Sparc® 2 will have ArcInfo® installed, allowing personnel to create and edit coverages at Fort Wainwright while working directly with databases at Fort Richardson. This will require training and regular hardware/software updates for new users of the GIS system at Fort Wainwright.

14-8b Develop GIS Database

Project Description. Continue development of the GIS database for Fort Wainwright and convert data to be compatible with other GIS systems.

Project Justification. USARAK GIS spatial data does not include lands outside Fort Wainwright boundaries, nor do they include the cantonment area. Data must be acquired statewide to meet the demand for information outside USARAK boundaries and to become a regional GIS center.

Master planning data, which includes all buildings and facilities within the cantonment area, are stored on a different computer platform with a different projection, making the data inaccessible to the GIS system. The data should be converted to an ESRI-compatible format and reprojected to the Universal Transverse Mercator System (UTM). Tri-Service Standards were developed for GIS implementations throughout DOD. USARAK data does not conform to these standards and must be transformed to comply with them.

Project Prescription. Natural Resource's digital data are stored within the USARAK GIS located at Fort Richardson. GIS database development is in progress for all USARAK installations. Appendix 14-8b lists current digital data layers for Fort Wainwright. Databases scheduled for completion or acquisition in 1998-2002 are digital orthophotos, remote imagery, master planning data conversion, statewide digital data acquisition, city/boroughs digital data acquisition, and conversion of existing data to Tri-Service Standards. Below are steps to be taken during 1998-2002 to meet the needs of Fort Wainwright, USARAK, and their partners.

- Obtain Digital Orthophotos - Digital orthophotos are softcopy photography that has been corrected for photo scale variation, geometric distortion, and image displacement resulting from relief and tilt. Fort Wainwright does not possess digital imagery. Color infrared photography is preferable for delineation of water, vegetation, and artificial features. This photography must also possess a high spatial resolution (less than or equal to 1 meter) so small features can be distinguished.
- Obtain Remote Imagery - Satellite images are a complementary interpretive tool to low altitude aerial photographs. For instance, large features extending many kilometers might be evident from a satellite image but escape notice on low altitude photographs. In addition, a single Landsat image would encompass approximately 1600 1:20000 photographs. Satellite Probatoire d'Observation de la Terre (SPOT) is a French government satellite program that has off-nadir viewing capabilities and affords full-scene stereoscopic imaging from two different satellites. These data can be acquired in two modes of sensing; a 10-meter resolution "panchromatic" (black and white) mode or a 20-meter resolution multispectral (color infrared) mode. The use of SPOT data for natural resource interpretive purposes is desirable due to the excellent spatial resolution and its multispectral sensing capabilities.
- Convert Master Planning Data - Master planning data, which includes building locations and dimensions, roads, power lines, and other planimetric features, are stored in a CAD program using a local map projection. Prior to use with existing GIS data, Master Planning data must be converted for use with ESRI software in a UTM projection. This conversion will enable the USARAK GIS to access the data and, when requested, produce maps or other customer-needed outputs.
- Acquire Statewide (Including City/Borough) Digital Data - Often spatial data for areas outside Fort Wainwright boundaries are requested,

including area maps of adjacent lands, landforms, off-post vegetation composition, and census information for surrounding communities. Much of this information has already been developed by various government and private organizations and is available for a charge.

- Convert Existing Data to Tri-Service Standards - Tri-Service Spatial Data Standards (TSSDS) were developed for use as a basis for GIS implementations at Air Force, Army, and Navy Installations. The TSSDS were designed to complement Federal Geographic Data Committee data standards that address small scale mapping with graphic and attribute data standards for entities depicted in large scale mapping. It was developed with the intention that it must be compatible with the predominant commercially available CADD, GIS, and relational database software used by DOD organizations. TSSDS has become the standard for GIS implementations throughout the DOD and in other federal, state, and local government organizations.

14-8c GIS Projects

Project Description. Conduct specific GIS projects for Fort Wainwright.

Project Justification. The Fort Wainwright spatial database is incomplete and outdated. Some information is mission-critical for military trainers planning exercises or natural resource personnel proposing management actions. Military trainers are required to adhere to strict environmental regulations prescribed by other federal agencies. It is essential that personnel be informed of off-limits areas, areas of sensitivity, and restricted training areas. Through GIS, spatial data can be presented to trainers as maps depicting the condition and restrictions placed on training lands, permitting troops to train to standard. Often the land manager is placed under these same constraints and requires information to comply with federal and state regulations. In addition, natural resource personnel can use GIS to predict future actions based on current environmental conditions. Finally, this information is essential to track environmental trends on Fort Wainwright. If baseline information is available, comparisons can be made to quantify enhancements or degradation of the land based on management decisions.

Project Prescription. The following specific GIS projects for Fort Wainwright will be accomplished during 1998-2002.

- Forest Cover Types - The forest cover data layer will consist of polygon information with species composition, density, vertical distribution, size distribution, mortality, regeneration, and percent cover. This information can be derived most accurately from intensive field surveys associated with forest inventory. Vegetative cover is often an important factor when planning training missions or natural resource actions. Bivouac locations, zones of engagement, and concealment are often selected based on various vegetative characteristics. In natural resource management, the same information is used to determine timber stand and wildlife habitat improvement. This information, in conjunction with other data, can be used to create additional GIS data layers, such as land use, wetland distribution, and military trafficability.

- Noise Contours - Noise information is an important tool for military planners and is required by the Incompatible Use Zones program. Once developed, noise contours will be used to assist military and design personnel when siting new weapon systems based on noise levels generated by weapon discharge. This information is also important when determining maximum size of an explosive device to be discharged in an impact area.

- Installation Training Capacity Maps for ITAM - ITC maps are a standardized set of information requested through DA to spatially depict the capacity of each installation to support maneuver training.

- General Wetland Permit Mapset - The wetland permit mapset will be used to obtain a general wetland permit for Fort Wainwright. Due to difficulties encountered in wetland delineation and enforcement actions, a programmatic wetlands permit is desired to set aside non-critical wetlands and to minimize military disturbance on these lands.

- GPS and Map Ranges - To enhance the training mission, a data layer depicting range limits,

facilities, and target locations will be obtained. This data layer will be generated using GPS technology to acquire the location of each feature with an accuracy of one meter. Following data acquisition, maps will be produced and distributed to military trainers.

- Update Terrain Analysis Maps - Terrain analysis maps are the basic spatial data required for the development of Intelligence Preparation for Battlefield (IPB) operations. Map information includes relief and drainage, vegetation, surface materials, manmade features and land evaluation. Corrected information has been acquired since these were first developed and distributed; an updated map set will be produced.
- Military Map Gazetteer - The Military Map Gazetteer is a book comprised of photomaps of the entire post. These maps will consist of scalable, low-level, aerial photographs overlaid with geo-referenced information found on DMA special maps. The objective of this book is to assist trainers in mission planning and navigation by depicting planimetric and natural resource features on a high-resolution aerial photograph.
- Update Fire Management Units - This project has been accomplished by AFS as of September 1998.
- Military Operations Areas (MOA) - The U.S. Air Force adopted an airspace-sharing and priority arrangement with a coalition of partners within Alaska to conduct its military mission, provide access for civilian aircraft, and minimize impacts to the environment. MOAs include a multitude of fly-over areas above federal, state, and private lands that specify minimum and maximum altitudes. Products derived from the information will be a 3-D representation of MOAs overlaying a topographic model of affected areas to assist Air Force operations personnel.